

A NEW SPECIES OF THE CRANGONID GENUS *PHILOCHERAS* STEBBING  
(CRUSTACEA: DECAPODA: CARIDEA) FROM NORTHEASTERN AUSTRALIA

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A new species of crangonid shrimp, *Philocheras brucei*, is described from Cairns, Queensland. The distinct lateral tooth on the antennal scale links the new species to *P. angustirostris* (De Man, 1918), *P. incisus* (Kemp, 1916), *P. kemp*i (De Man, 1918), *P. parasculptus* Burukovsky, 1991, *P. sculptus* (Bell, 1847) and *P. vanderbilti* (Boone, 1935). The carination and dentition of the carapace and sculpture of the abdomen distinguish this new species from the other species. □ *Decapoda, Caridea, Philocheras, Queensland.*

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*Philocheras* Stebbing, 1900 is the most speciose genus in the Crangonidae, represented by about 50 species worldwide. It is widespread in tropical to temperate waters, although poorly represented in the eastern Pacific and western Atlantic (Chace, 1984). The genus had long been treated as junior synonym of *Pontophilus* Leach, 1817 since Kemp (1911), but Chace (1984) reinstated *Philocheras* as a valid genus. Christoffersen's (1988) phylogenetic analysis of the Crangonidae also supports the generic status of *Philocheras*. *Philocheras* is characterized by the usual lack of lateral teeth on the rostrum, the transversely oblong stylocerite of the antennule, first pereopod without exopod, and second pereopod usually overreaching the extended merus of the first pereopod. Seven species are known from Australia: *P. flindersi* (Fulton & Grant, 1902) from Victoria; *P. intermedius* (Bate, 1863) from the Gulf of St Vincent; *P. lowisi* (Kemp, 1916) from the Timor Sea; *P. obliquus* (Fulton & Grant, 1902) from Victoria; *P. pilosus* (Kemp, 1916); *P. planoculminis* Bruce, 1994 from the Timor Sea; and *P. victoriensis* (Fulton & Grant, 1902) from Victoria.

Specimens of small crangonid shrimp collected during the surveys of inshore waters of northern Queensland, were submitted to the author for identification by Alexander J. Bruce of the Queensland Museum. Close examination revealed that these specimens represent a new species of *Philocheras*, here described as *P. brucei*. The new species is compared with *P. angustirostris* (De Man, 1918), *P. incisus* (Kemp, 1916), *P. kemp*i (De Man, 1918), *P. parasculptus* Burukovsky, 1991, *P. sculptus* (Bell, 1847) and *P. vanderbilti* (Boone, 1935).

The type specimens are deposited in the Queensland Museum (QM). CL refers to the postorbital carapace length.

SYSTEMATICS

Order DECAPODA  
Family CRANGONIDAE  
Genus *Philocheras* Stebbing, 1900

*Philocheras brucei* sp. nov.  
(Figs 1-4)

ETYMOLOGY It is my pleasure to dedicate this new species to Dr Alexander J. Bruce in recognition of his great contributions to the systematics of decapod crustaceans, particularly carideans in the Indo-Pacific.

MATERIAL. Holotype: 1 ♂ (CL 2.6mm), Cairns, northeast Queensland, 16°55'S, 145°46'E, 10m, beam trawl, shot 467, 19 November 2001, coll. K. Neil, QMW26737a. Paratypes: 3 ♂♂ (CL 1.8-2.2mm), 4 non-ovigerous ♀♀ (CL 1.6-2.1mm), 1 ovigerous ♀ (CL 2.9mm), similar locality as holotype, beam trawl, shot 508, coll. K. Neil, QMW26736; 3 ♂♂ (CL 2.2-3.0mm), 2 non-ovigerous ♀♀ (CL 2.3, 2.5mm), 1 ovigerous ♀ (CL 2.9mm), same data as holotype, QMW26737b.

DESCRIPTION. Body (Fig. 1) moderately stout for genus. Rostrum (Fig. 2A-C) narrow, falling slightly short of or reaching distal margins of eyes, slightly upturned distally, gradually tapering to truncated tip; anterior surface of truncated tip nearly flattened or slightly concave, lacking deflexed terminal lobe, circular in anterior view (Fig. 2C, inset); dorsal surface shallowly sulcate; lateral margins unarmed, with row of long setae extending onto orbital margin, covering corneal surface; ventral margin sharply carinate. Carapace (Figs 1, 2A) slightly longer than broad postorbitally, covered with short pubescence, shallowly depressed areas with

dense, longer setae; shallow, broad transverse furrow posterior to rostral base; median carina low, extending to 0.80-0.85 length of carapace, terminating in small, sharp gastric tooth at 0.15-0.16 of carapace length, smooth or faintly tuberculate on dorsal margin, but without distinct tooth other than gastric tooth; postorbital carina low, interrupted, occasionally obsolete; anterior section not connected with rostral lateral margin, terminating anteriorly in small acute tooth at level of gastric tooth, posterior section extending nearly to posterodorsal margin of carapace; hepatic tooth arising slightly posterior to level of orbital margin, supported by low ridge; branchial carina very low, occasionally rudimentary, if discernible, beginning from somewhat posterior to hepatic tooth to level of posterodorsal margin of carapace; orbital margin concave, without cleft; antennal tooth small; branchiostegal tooth moderately long, reaching dorsodistal margin of antennal basicerite; pterygostomial tooth tiny.

Thoracic sternum (Fig. 2D,E) widened posteriorly, with long median spur on fourth sternite far overreaching coxae of second pereopod; in males (Fig. 2D) and non-spawning females, sternal surface convex with transverse sutures or furrows indicating fifth to eighth somites clearly discernible, sixth to eighth sternites each with sharp median tooth; in males, each sternite with transverse row of setae; in spawning females (Fig. 2E), sternal surface concave, sutures or furrows indicating somites indistinct, median teeth on sixth to eighth somites completely reduced.

Third maxilliped with 1 small arthrobranch; pleurobranchs present on fourth through eighth thoracic somites, ventral apices all directed posteriorly.

Abdomen (Fig. 1) sculptured by complex pattern of shallow transverse grooves or depressions and low carinae on first to fifth somites; grooves covered with short setae, but carinae or elevated parts naked. First somite with faint median carina connected with posterodorsal carina. Second somite also with faint median carina interrupting transverse groove. Third and fourth somites with low, distinctly delimited median carinae occasionally connected with transverse carinae. Fifth somites with paired median carinae divided by shallow longitudinal groove widened posteriorly. Sixth somite with low, broad median carina bearing shallow occasionally paired depressions on either side of midline. Pleura of first to fifth somites each with small to large patches of short setae; ventral

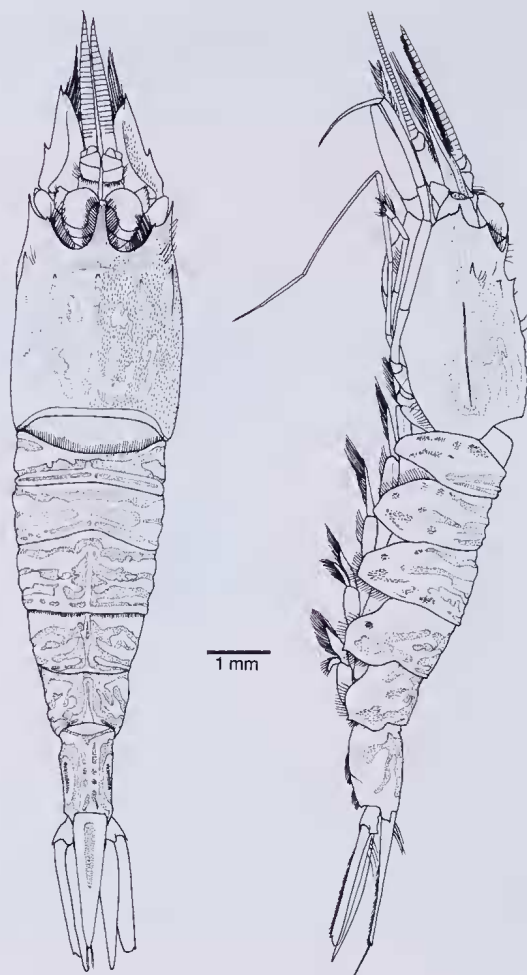


FIG. 1. *Philocheras brucei* sp. nov. Entire animal in lateral and dorsal views (fifth pereopod missing). Holotype, ♂ (CL 2.6mm; QMW26737a).

margin rounded or slightly angular in first to third somites; pleuron of fourth somite sinuous on anteroventral margin, convex on posterolateral margin, with subacute posteroventral tooth; pleuron of fifth somite sinuous on both anteroventral and posteroventral margins, with small posteroventral tooth. Sixth somite about  $1.60 \times$  longer than fifth somite and  $1.50 \times$  longer than greatest height; ventral surface with thick assemblage of long setae on either side of V-shaped median depression. Teison (Fig. 2G) moderately narrow, about  $1.60 \times$  longer than sixth somite, tapering posteriorly and terminating in small triangular projection; dorsal surface with shallow median sulcus filled with short setae in

anterior half, lacking dorsolateral spines; lateral margin with broad, very low convexity subproximally; posteromedian projection (Fig. 2H) flanked by 1 pair of long spiniform setae and 1 pair of plumose setae slightly longer than spiniform setae.

First to fifth abdominal sternites each with blunt median tubercle becoming smaller toward posterior in males and non-spawning females; median tubercles completely reduced in spawning females.

Cornea of eye (Figs 1, 2A) placed anterodorsally on eye-stalk, darkly pigmented and well faceted, maximum diameter 0.25-0.30 of carapace length. Eye-stalk lacking dorsal tubercle.

Antennular peduncle (Figs 1, 2A) reaching midlength of antennal scale in males, falling short of it in females, stouter in males than in females. First segment longer than distal two segments combined, dorsal surface strongly concave to accommodate eye, bearing oblique row of setae; ventromesial ridge with small tooth medially; stylocerite subquadrate with anterolateral angle weakly produced anteriorly, rounded, and posterolateral margin bluntly angular. Second segment wider than long, with slightly produced anterolateral angle. Third segment as wide as second segment in males, somewhat narrower than it in females. Lateral flagellum overreaching distal margin of lamella of antennal scale by half length in males, 0.20-0.25 length in females, much stouter in males than in females, composed of about 20 articles in males, 7-10 articles in females; mesial flagellum longer than lateral flagellum, composed of about 10 articles.

Antenna (Figs 1, 2A) with basicerite stout, with small ventrolateral tooth. Carpocerite stout, overreaching midlength of antennal scale. Antennal scale narrowed distally; dorsal surface with covering of short setae except for strongly concave median ridge; lateral margin armed with large tooth arising at about midlength, margin proximal to lateral tooth slightly concave or sinuous, margin distal to lateral tooth nearly straight; distolateral tooth large, far overreaching narrow, obliquely rounded distal margin of blade.

Mandible (Fig. 2I) principally 3-toothed, largest tooth with small accessory tooth. Maxillule (Fig. 2J) with ovate coxal endite bearing row of setae on mesial margin; basal endite strongly curved mesially, truncate terminally, armed with 4 or 5 spines arranged in

double row; palp somewhat curved, terminating in small lobe bearing 1 apical spiniform seta. Maxilla (Fig. 2K) with 2 lobes on mesial margin, possibly representing rudimentary endites, proximal lobe with few long setae; palp strongly curved mesially, with apical seta; scaphognathite with somewhat elongate, rounded posterior lobe bearing very long setae on posterior margin. First maxilliped (Fig. 2L) lacking endites; palp flattened, nearly reaching distal margin of exopod, bearing 1 very long plumose seta and some subdistal setae; exopod with narrow caridean lobe fringed with row of short setae; exopodal flagellum well developed; epipod somewhat elongate longitudinally, faintly bilobed. Second maxilliped (Fig. 2M) with endopod apparently composed of 6 segments with basis and ischium fused; dactylus and propodus with row of slender spines on mesial margin and stiff setae, dactylus with cluster of short setulose setae at terminal margin; exopod slender, slightly overreaching distal margin of carpus of flexed endopod, bearing well developed flagellum; epipod subrectangular, bearing multilamellate podobranch. Third maxilliped (Fig. 3A) 4-segmented, flattened dorsoventrally, overreaching distal margin of antennal scale (except for distolateral tooth) by half length of ultimate segment; ultimate segment 1.10-1.20 longer than carpus (= penultimate segment), moderately narrow (5.5-6.0  $\times$  longer than basal width), tapering distally, mesial margin with row of long setae; carpus with short to long setae on dorsal surface and lateral margin, mesial surface with numerous transverse tracts of dense, stiff setae; antepenultimate segment (merus, ischium and basis fused segment) strongly sinuous in dorsal view, setose on margins, setae on dorsolateral distal angle particularly elongate; distal part of ventral surface with short longitudinal row of 8-10 spinules directed laterally (Fig. 3A, inset); coxa stout, with rectangular lateral process and small setose protuberance on mesial surface; exopod reaching beyond midlength of antepenultimate segment, somewhat tapering distally, bearing well developed flagellum.

First pereopod (Fig. 3B) stout, reaching or slightly overreaching distal margin of antennal scale; palm of subchela (Fig. 3C) not narrowed distally, moderately stout (2.90-3.10  $\times$  longer than wide), mesial surface with stiff setae or spiniform bristles proximally extending to midway between base of palm and base of pollex; cutting edge strongly oblique, with submarginal

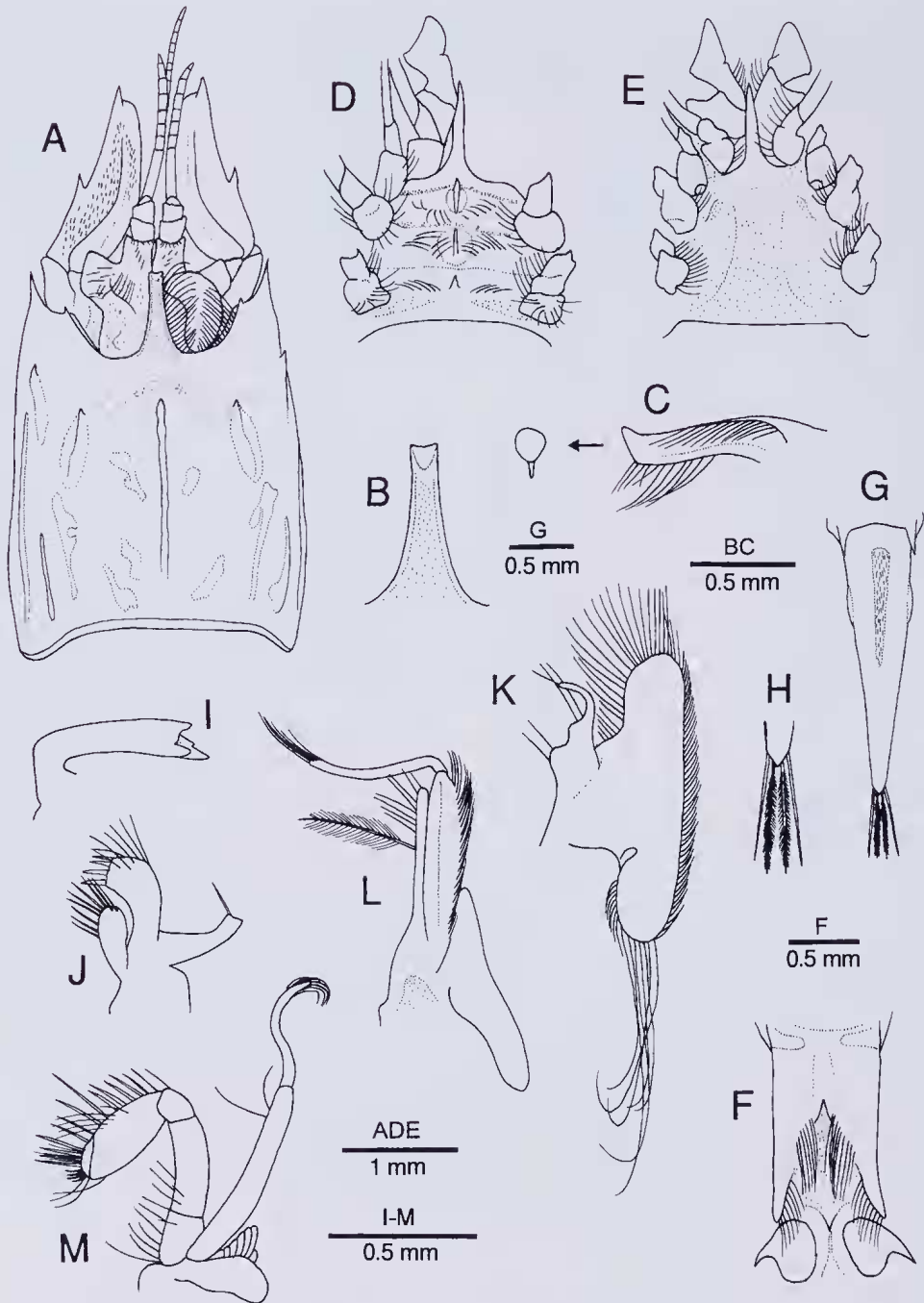


FIG. 2. *Philocheirus brucei* sp. nov. A, carapace and cephalic appendages, dorsal view; B, rostrum, dorsal view; C, same, lateral view; inset, anterior surface of rostrum, anterior view; D, E, thoracic sternum, ventral view; F, sixth abdominal somite, ventral view; G, telson, dorsal view; H, posterior part of telson, dorsal view; I, left mandible, dorsal view; J, left maxillule, ventral view; K, left maxilla, ventral view; L, left first maxilliped, ventral view; M, left second maxilliped, ventral view. A-C, E, paratype ovigerous ♀ (CL 2.9mm; QMW26737b); D, F, G, H, holotype, ♂ (CL 2.6mm; QMW26737a); I-M, paratype, ♀ (CL 2.1mm; QMW26736).

row of short setae dorsally and ventrally; pollex basally articulated, straight or slightly recurved; carpus short, with small ventrodorsal tooth on lateral margin and cluster of stiff setae on mesial surface; dactylus about half length of palm; merus strongly compressed laterally, with small dorsodorsal tooth, but unarmed on dorsolateral margin; ventral margin of merus somewhat sinuous. Second pereopod (Fig. 3D) reaching distal margin of carpus of anteriorly extended first pereopod, chelate; dactylus subequal in length to palm, with long, setulose unguis; chela shorter than carpus, pollex also with long, setulose unguis; carpus shorter than merus, with 2 long spiniform setae at ventrodorsal angle; ischium and merus with row of long plumose setae on dorsal margin and row of long spiniform setae on ventral margin. Third pereopod (Fig. 3E) very slender, overreaching distal margin of antennal scale by length of dactylus, propodus and 0.50-0.60 of carpus length; dactylus about  $0.70 \times$  as long as propodus, terminating in acute tip; carpus elongate, longer than distal two segments combined or merus; merus slightly longer than ischium; ischium with row of setae on dorsal margin; coxa stout, setose, but lacking lateral projection. Fourth pereopod (Fig. 3F) moderately slender for genus, overreaching distal margin of scaphocerite by length of dactylus; dactylus about  $0.90 \times$  of propodus length, slender, weakly curved, weakly flattened dorsoventrally, terminating acutely; ventral surface of dactylus medially ridged in proximal half; propodus with row of setae on dorsal surface; carpus  $0.37-0.40 \times$  as long as propodus; merus and ischium with row of setae on dorsal and ventral surfaces (dorsal setae longer than ventral setae), merus  $1.80-1.90 \times$  longer than ischium and  $9.0-10.0 \times$  longer than height. Fifth pereopod (Fig. 3G) similar to fourth pereopod, but slightly shorter and less setose; dactylus  $0.80-0.90 \times$  as long as propodus.

Pleopods of males (Fig. 4A,B,D-F) with stout protopods somewhat widened distally.

Endopod of first pleopod (Fig. 4A) about half length of exopod, tapering distally to blunt tip, with row of setae becoming spiniform distally; endopods of second to fifth pereopods (Fig. 4B-F) 0.50-0.60 length of exopods, each with stout appendix internac; appendices internae each with minute cincinnuli. Appendix masculina on second pleopod (Fig. 4C) stout, distinctly longer than appendix interna, but not reaching tip of endopod, armed with several long

spiniform setae on rounded, subtruncate distal portion.

Pleopods in spawning females (Fig. 4G-K) with less stout protopods (about half as wide as those of males); exopod articulated perpendicular to horizontal plane of protopod. Endopod of first pleopod (Fig. 4G) about 0.60 length of exopod, not tapering distally with rounded distal margin, bearing row of setae on margins; endopod of second pleopod (Fig. 4H) 0.50-0.60 length of exopod; endopod of third pleopod (Fig. 4I) about half length of exopod; endopod of fourth pleopod (Fig. 4J) nearly straight, about 0.40 length of exopod, with sparse marginal setae; endopod of fifth pleopod (Fig. 4K) reduced, subtriangular, with some marginal setae. Appendices internae becoming smaller posteriorly, all lacking cincinnuli, but with few long setae; fifth pleopod lacking appendix interna.

Pleopods in non-spawning females with endopods relatively smaller than those of spawning molts; appendices internae lacking cincinnuli or long setae.

Uropod (Fig. 1) with both rami distinctly overreaching tip of telson. Endopod narrow, tapering distally. Exopod shorter than endopod, lacking diaeresis; lateral margin nearly straight, terminating in small tooth far falling short of rounded posterior margin of lamella.

COLOURATION. Unknown.

SIZE. Males 1.8-3.3mm; females 1.6-2.9mm, ovigerous individuals 2.9mm.

DISTRIBUTION. Cairns, Queensland; 10m.

REMARKS. *Phidochetas brucei* sp. nov. has a distinct lateral tooth on the antennal scale. The following 6 species of *Philocheras* also possess a single lateral tooth on the antennal scale: *P. angustirostris* (De Man, 1918); *P. incisus* (Kemp, 1911); *P. kemp* (De Man, 1918); *P. parasculptus* Burukovsky, 1992; *P. sculptus* (Bell, 1847); and *P. vanderbilti* (Boone, 1935). Differences between these species and *P. brucei* are discussed below.

*Philocheras angustirostris* differs from *P. brucei* having 3 lateral teeth on the carapace (De Man, 1920), rather than 2 teeth in the latter. The middorsal carina is interrupted in *P. angustirostris*, rather than entire in *P. brucei* sp. nov. The merus of the first pereopod is armed with 3 tiny teeth on the distolateral margin in *P. angustirostris*, while that margin is unarmed in *P.*

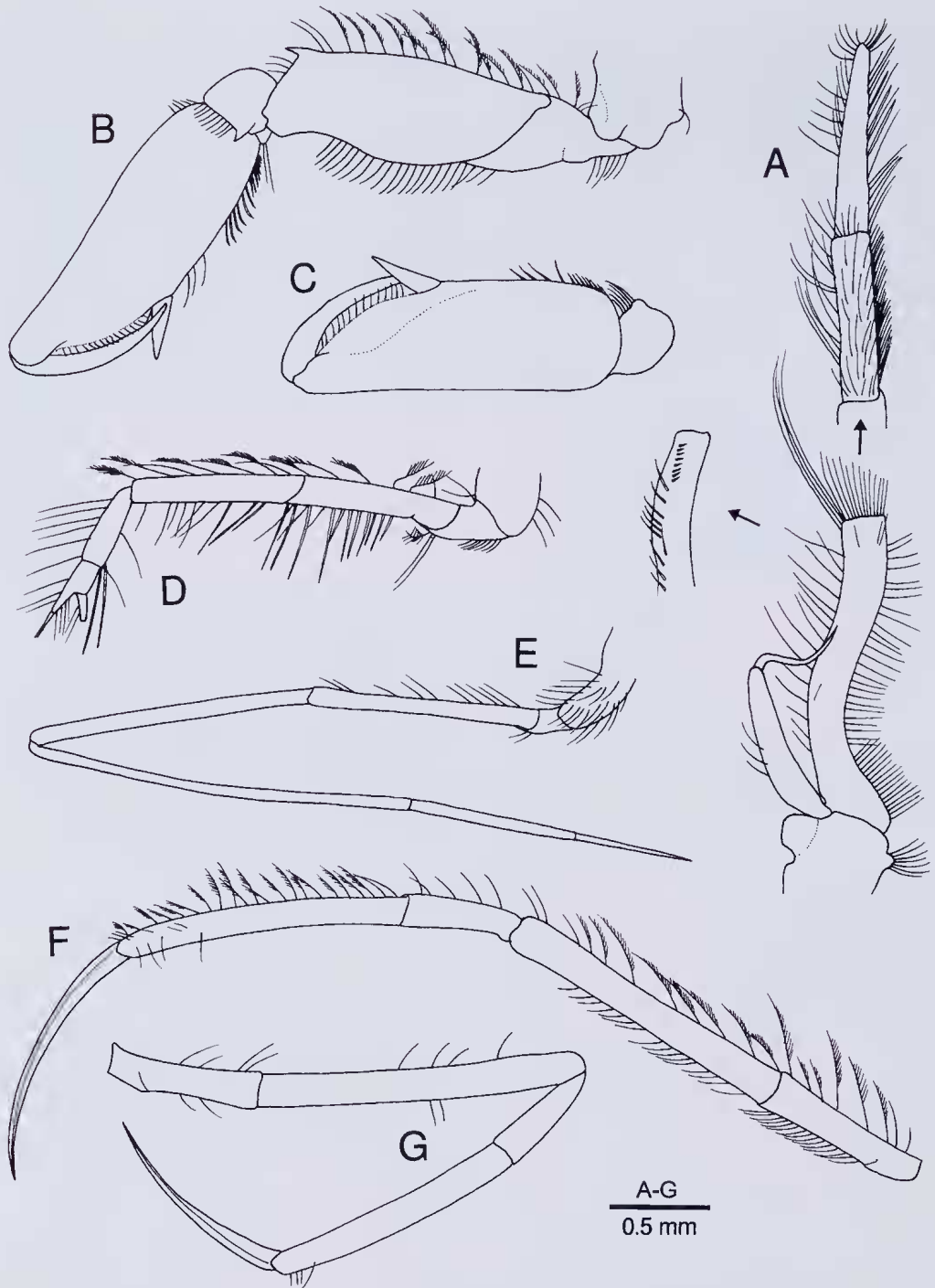


FIG. 3. *Philocheirus brucei* sp. nov. A, left third maxilliped, dorsal view; inset distal part of antepenultimate segment, ventral view; B, left first pereiopod, lateral view; C, same, subchela, dorsal view; D, left second pereiopod, lateral view; E, left third pereiopod, lateral view; F, left fourth pereiopod, lateral view; G, right fifth pereiopod, lateral view. Holotype, male (CL 2.6mm; QMW26737a).

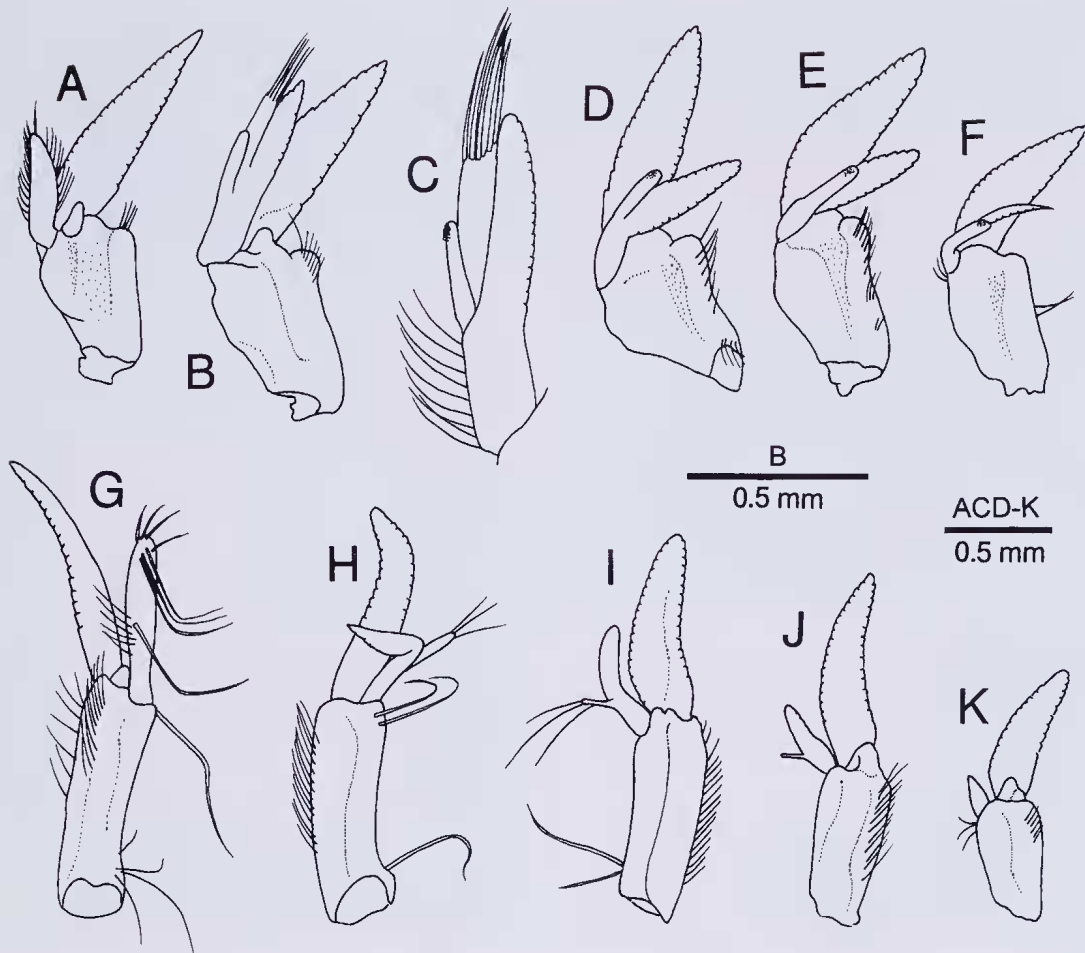


FIG. 4. *Philocheras brucei* sp. nov. Left pleopods. A, G, first pleopods (A, ventral view; G, dorsal view); B, H, second pleopods (B, ventral view; H, dorsal view); C, appendix masculina and appendix interna of second pleopod; D, I, third pleopods, ventral view; E, J, fourth pleopods, ventral view; F, K, fifth pleopods, ventral view. A-F, holotype, ♂ (CL 2.6mm; QMW26737a); G-K, paratype, ovigerous ♀ (CL 2.9mm; QMW26737b).

*brucei* sp. nov. *Philocheras angustirostris* is known from the Arabian Sea, Bay of Bengal and Indonesia, at depths of 13-83m (Chace, 1984). *Philocheras incisus* is easily separated from *P. brucei* by the distinctly broader-rostrum with a distinctly concave anterior margin and with a terminal lobe abruptly deflexed into a vertical plane, by the distinct lateral carinae on the carapace subdivided in short lobes and by the sharp tooth posterior to the hepatic tooth. The lateral tooth on the antennal scale arises usually subproximally in *P. incisus*, rather than arising from about the midlength in *P. brucei* sp. nov. The median carina on the third abdominal somite is distinctly higher in *P. incisus* than in *P. brucei*

sp. nov. *Philocheras incisus* is widely distributed in the Indo-West Pacific region, including the Arabian Sea, Bay of Bengal, Indonesia, Philippines, East China Sea and southern Japan, at depths of 3-110 m (Chace, 1984).

*Philocheras kemp* is readily distinguished from *P. brucei* the possession of a sharp tooth posterior to the hepatic tooth, the absence of a distal blade on the antennal scale, and the fixed pollex of the first pereiopod (De Man, 1920). *Philocheras kemp* is known only by the type material taken in the Flores Sea, Indonesia, at depths of 300-400m (Chace, 1984).

*Philocheras parasculptus* and *P. sculptus*. These two species are immediately distinguished

from *P. brucei* sp. nov. by the much broader rostrum widened distally, the second middorsal tooth and of a sharp tooth posterior to the hepatic tooth on the carapace, and the high median carina on the third abdominal somite (Kemp, 1910; Crosnier & Forest, 1973; Burukovsky, 1991). *Philocheras parasculptus* is represented only by the holotype from the SW Indian Ocean (33°16'S, 43°53'E), at depths of 415-460 m (Burukovsky, 1991). *Philocheras sculptus* is widely distributed in the W Atlantic and the Mediterranean, ranging from intertidal to 400 m (Udckem d'Acoz, 1999).

*Philocheras vanderbilti* differs from *P. brucei* by its much broader rostrum with a distinctly concave anterior margin, 3 middorsal teeth, 3 lateral teeth, and non-sculptured abdomen (Boone, 1935). *Philocheras vanderbilti* is known only by the holotype from the Lesser Sunda Islands, Indonesia, at a depth of 256m (Chace, 1984).

After Kemp (1911) synonymised *Philocheras* with *Pontophilus*, Kemp (1916) divided the genus into 5 groups on the development of the endopods and appendices internae of pleopods. One of these groups (Group I) corresponds to *Pontophilus* and *Parapontophilus* Christoffersen, 1988, leaving the other 4 groups in *Philocheras*. De Grave (2000) remarked, however, that pleopodal development is varied within *Philocheras* and cannot be used to indicate intrageneric relationships. Indeed, *Philocheras brucei* and *P. angustirostris*, present a further type of pleopodal development with well-developed endopods on the pleopods 1-4 and a well-developed appendix interna on pleopod 2 and somewhat reduced appendices internae on pleopods 3-4 in the female. Among the other species compared with *P. brucei*, *P. incisus* and *P. sculptus* were referred to Group II (Kemp, 1916).

Pleopodal development is poorly understood for *P. kempii*, *P. parasculptus* and *P. vanderbilti*. Although the highly variable pleopodal development in the genus is remarkable, its ecological significance remains unclear.

The new species brings the number known in Australian waters of this genus to 8.

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